07 December 2010

DAVID DUNCAN MARA

Curriculum Vitae

Date of birth: **3 October 1944**

Nationality: **British and Canadian**

Education and Degrees

Downside School, Bath, England (1957–62): 'A' and 'S' levels in Latin, Greek and Ancient History.

City of Bath Technical College (1962–63): 'A' levels in Physics and Mathematics.

University of St. Andrews, Scotland (1963–67): BSc (2nd Class Honours) in Civil Engineering.

University of Dundee, Scotland (1967–70): PhD in Civil Engineering.

University of Leeds, England (2001): DSc(Eng) in Civil Engineering.

Professional Qualifications

European Engineer (EurIng), Fédération Européenne d'Associations Nationales d'Ingénieurs

Fellow of the Institution of Civil Engineers (FICE) and **Chartered Civil Engineer**

Fellow of the Society of Biology (FSB) and **Chartered Biologist**

Fellow of the Chartered Institution of Water and Environmental Management (FCIWEM) and **Chartered Water and Environmental Manager**

Fellow of the Royal Society of Public Health (FRSPH)

Fellow of the Higher Education Academy (FHEA)

Present Appointments

Professor of Civil Engineering, University of Leeds, England (1979–present).

Visiting Professor of Environmental Engineering, Instituto Cinara, Universidad del Valle, Cali, Colombia (1996–present).

Previous Appointments

Lecturer in Civil Engineering (Public Health Engineering), University of Nairobi, Kenya (1970–1973).

Lecturer/Senior Lecturer in Civil Engineering (Public Health Engineering), University of Dundee, Scotland (1974–79).

Visiting Professor of Sanitary Engineering, Universidade Federal da Paraíba, Campina Grande, Paraíba, Brazil (1976–1994).

Trustee and Member of Council, WaterAid, London, England (1989–2001).

Chairman, Lagoon Technology International Ltd, Leeds, England (1987–1998).

Senior Technical Advisor, United Nations Development Programme/World Bank Inter-regional Project INT/81/047 (originally GLO/78/006) (Technology Advisory Group – TAG; now the Water and Sanitation Program) (1978–1986).

Awards

IAWPRC/Pergamon Publication Medal, 1990
IWA/Pergamon Publication Medal, 2000
CIWEM World of Difference Award, 2007

Current Research Activities

1. Tropical wastewater treatment (especially waste stabilization ponds and wastewater storage and treatment reservoirs); agricultural and aquacultural reuse of treated wastewaters, including quantitative microbial risk analysis.
2. Water and excreta-related diseases; tropical sanitary microbiology.
3. Low-cost periurban sanitation in developing countries.
4. Waste stabilization pond systems for the rural UK and Europe.

For details of current and recent research grants, please see attached list.

International Committee Membership

1. Editorial Panel, *Water21,* International Water Association, London (1996−2005).
2. International Editorial Panel, *Engenharia Sanitária*, Associação Brasileira de Engenharia Sanitária e Ambiental, Rio de Janeiro (2003−).
3. Editorial Panel, *Ingeniería y Competitividad*, Universidad del Valle, Cali (2006−).
4. International Editorial Board, *Journal of Water, Sanitation and Hygiene for Development*, International Water Association, London (2010−).

Publications

Please see attached list − many are available in pdf format at:
www.personal.leeds.ac.uk/~cen6ddm

Languages

Portuguese (very good); French, Italian, Spanish (reasonable); Kiswahili (basic).

DAVID DUNCAN MARA

Publications

A. Books

1. *Bacteriology for Sanitary Engineers*. Edinburgh: Churchill Livingstone, 1974.

2. *Design Manual for Sewage Lagoons in the Tropics.* Nairobi: East African Literature Bureau, 1975.

3. *Sewage Treatment in Hot Climates.* Chichester: John Wiley, 1976 (also ELBS, 1978).

4. *Water, Wastes and Health in Hot Climates* (co-edited with Richard Feachem and Michael McGarry). Chichester: John Wiley, 1977 (also ELBS, 1978).

5. *Tratamentos Biológicos de Águas Residuárias – Lagoas de Estabilização* (co-authored with Salomão A. Silva). Rio de Janeiro: Associação Brasileira de Engenharia Sanitária e Ambiental, 1979.

6. *Appropriate Sanitation Alternatives: A Planning and Design Manual* (co-authored with John Kalbermatten, DeAnne Julius and Charles Gunnerson). Baltimore: Johns Hopkins University Press (A World Bank Research Publication), 1982.

7. *Sanitation and Disease: Health Aspects of Excreta and Wastewater Management* (co-authored with Richard Feachem, David Bradley and Hemda Garelick). Chichester: John Wiley (A World Bank Research Publication), 1983.

8. *Waste Stabilization Ponds: Design Manual for Mediterranean Europe* (co-authored with Howard Pearson). Copenhagen: World Health Organization Regional Office for Europe, 1987.

9. *Waste Stabilization Ponds* (Proceedings of the First IAWPRC International Specialist Conference on WSP) (co-edited with Maria Helena Marecos do Monte). Oxford: Pergamon Press, 1987.

10. *Guidelines for the Safe Use of Wastewater and Excreta in Agriculture and Aquaculture: Measures for Public Health Protection* (co-authored with Sandy Cairncross). Geneva: World Health Organization, 1989.

11. *The Conservation of Drinking Water Supplies: Techniques for Low-income Settlements*. Nairobi: United Nations Centre for Human Settlements, 1989.

12. *Guide pour l'Utilisation sans Risques des Eaux Résiduaires et des Excreta en Agriculture et Aquaculture: Mesures pour la Protection de la Santé Publique* (avec Sandy Cairncross). Genève: Organisation Mondiale de la Santé, 1991.

13. *Waste Stabilization Ponds: A Design Manual for Eastern Africa* (co-authored with Howard Pearson, Graham Alabaster and Stephen Mills). Leeds: Lagoon Technology International, 1992.

14. *Waste Stabilization Ponds: A Design Manual for the Islamic Republic of Iran* (in Farsi). Tehran: Ministry of Energy, 1994.

15. *Analysis of Wastewater for Use in Agriculture: A Laboratory Manual of Parasitological and Bacteriological Techniques* (co-authored with Rachel Ayres). Geneva: World Health Organization, 1996.

16. *Low-cost Urban Sanitation*. Chichester: John Wiley & Sons, 1996.

17. *Waste Stabilization Ponds: Technology and Applications* (Proceedings of the Third IAWQ International Specialist Conference on WSP) (co-edited with Howard Pearson and Salomão Silva). Oxford: Pergamon, 1996.

18. *Low-cost Sewerage*. Chichester: John Wiley & Sons, 1996.

19. *Design Manual for Waste Stabilization Ponds in India*. Leeds: Lagoon Technology International, 1997.

20. *Design Manual for Waste Stabilization Ponds in Mediterranean Countries* (co-authored with Howard Pearson). Leeds: Lagoon Technology International, 1998.

21. *Waste Stabilization Ponds: Technology and the Environment* (Proceedings of the Fourth IAWQ International Specialist Conference on WSP) (co-edited with Howard Pearson and Yosi Azov). London: IWA Publishing, 2000.

22. *PC-based Simplified Sewer Design* (co-authored with Andrew Sleigh and Kevin Tayler). Leeds: University of Leeds (School of Civil Engineering), 2001.

23. *Waste Stabilization Ponds in Latin America* (Proceedings of the First Latin American Regional Conference on WSP) (co-edited with M. R. Peña and H. J. Gijzen). London: IWA Publishing, 2002.

24. *The Handbook of Water and Wastewater Microbiology* (co-edited with N.J. Horan). London: Academic Press, 2003.

25. *Domestic Wastewater Treatment in Developing Countries*. London: Earthscan Publications, 2004.

26. *Aqua 2003: Proceedings of the International Conference on Multiple Uses of Water for Life and Sustainable Development* (co-edited with M. R. Peña, I. Restrepo and H. Gijzen). London: IWA Publishing, 2006.

27. *Domestic Wastewater Treatment in Developing Countries* (Farsi translation). Tehran: Tohfeh Publications, 2009.

28. *Good Practice in Water & Environmental Management: Natural Wastewater Treatment.* London: Chartered Institute of Water & Environmental Management, 2011 (in press).

29. *Sanitation and Water Supply in Low-income Countries: An Introduction for Engineering Students* (co-authored with Barbara Evans). Copenhagen: Ventus Publishing ApS, 2011 (in press).

B. World Bank/UNDP Reports on Low-Cost Sanitation

P. R. Morgan and D. D. Mara (1982). *Ventilated Improved Pit Latrines: Recent Developments in Zimbabwe*. World Bank Technical Paper No. 3. Washington, DC: The World Bank.

B. A. Ryan and D. D. Mara (1983). *Pit Latrine Ventilation: Field Investigation Methodology*. TAG Technical Note No. 4. Washington, DC: The World Bank.

B. A. Ryan and D. D. Mara (1983). *Ventilated Improved Pit Latrines: Vent Pipe Design Guidelines*. TAG Technical Note No. 6. Washington, DC: The World Bank.

D. D. Mara (1985). *The Design of Ventilated Improved Pit Latrines*. TAG Technical Note No. 13. Washington, DC: The World Bank.

P. R. Morgan and D. D. Mara (1985). *Ventilated Improved Pit Latrines: Zimbabwean Brick Designs*. TAG Discussion Paper No. 1. Washington, DC: The World Bank.

D. D. Mara (1985). *Ventilated Improved Pit Latrines: Selection of Design Options*. TAG Discussion Paper No. 4. Washington, DC: The World Bank.

D. D. Mara (1985). *The Design of Pour-Flush Latrines*. TAG Technical Note No. 15. Washington, DC: The World Bank.

R. J. Otis and D. D. Mara (1985). *The Design of Small Bore Sewers*. TAG Technical Note No. 14. Washington, DC: The World Bank.

D. D. Mara (1985). *Ventilated Improved Pit Latrines: Guidelines for the Selection of Design Options*. TAG Discussion Paper No. 4. Washington, DC: World Bank.

C. Research Monographs in Tropical Public Health Engineering*

Series Editor: D. D. Mara (ISSN: 1351-1378).

No.1. *The effect of sunlight on mechanisms for the die-off of faecal coliform bacteria in waste stabilization ponds*, by T. P. Curtis and D. D. Mara, 1994.

No.3. *Lime treatment of tropical wastewater,* by H. D. Taylor, M. P. Gambrill and D. D. Mara, 1994.

No.4. *Low-cost composting of solid wastes*, by E. I. Stentiford, J. T. Pereira Neto and D. D. Mara, 1996.

No.5. *Development of a new approach to waste stabilization pond design*, by D. D. Mara, H. W. Pearson, J. I. Oragui, H. Arridge and S. A. Silva, 2001.

No.6. *An experimental evaluation of potential risks to human health from parasitic nematodes in wastewaters treated in waste stabilization ponds and used for crop irrigation*, by R. Stott, R. Ayres, D. L. Lee and D. D. Mara, 1994.

No.8. *Bacteriological aspects of wastewater irrigation*, by S. M. Vaz da Costa Vargas, R. K. X. Bastos and D. D. Mara, 1996.

No.9. *Performance of waste stabilization ponds in northeast Brazil*, by S. A. Silva, R. de Oliveira and D. D. Mara, 1998.

No.10. *Enumeration of rotaviruses in tropical wastewater*, by J. I. Oragui and D. D. Mara, 1996.

No.11. *Evaluation of waste stabilization ponds in Kenya*, by G. P. Alabaster, D. D. Mara, S. W. Mills, H. W. Pearson and W. N. Thithai, 1996.

No.12. *Wastewater storage and treatment reservoirs in northeast Brazil*, by D. D. Mara, H. W. Pearson, J. I. Oragui, L. R. Cawley, S. A. Silva and R. de Oliveira, 1997.

*Series funded by the former Overseas Development Administration and published by the University of Leeds (School of Civil Engineering).

D. Papers: 2010−present

Duncan Mara and Robert Bos (2010). Risk analysis and epidemiology: The 2006 WHO guidelines. In *Wastewater Irrigation and Health: Assessing and Mitigating Risks in Low-income Countries* (ed. P. Drechsel, C. A. Scott, L. Raschid-Sally, M. Redwood and A. Bahri), pp. 51−62. London: Earthscan.

Duncan Mara, Andrew Hamilton, Andrew Sleigh, Natalie Karavarsamis and Razak Seidu (2010). Tools for risk analysis: Updating the 2006 WHO guidelines. In *Wastewater Irrigation and Health: Assessing and Mitigating Risks in Low-income Countries* (ed. P. Drechsel, C. A. Scott, L. Raschid-Sally, M. Redwood and A. Bahri), pp. 89−100. London: Earthscan.

Blanca Jiménez, Duncan Mara, Richard Carr and François Brissaud (2010). Wastewater treatment for pathogen removal and nutrient recovery: Suitable systems for use in developing countries. In *Wastewater Irrigation and Health: Assessing and Mitigating Risks in Low-income Countries* (ed. P. Drechsel, C. A. Scott, L. Raschid-Sally, M. Redwood and A. Bahri), pp. 149−169. London: Earthscan.

Christopher A. Scott, Pay Drechsel, Akiça Bahri, Duncan Mara, Mark Redwood, Liqa Raschid-Sally and Blanca Jiménez (2010). Wastewater irrigation and health: Challenges and outlook for mitigating risks in low-income countries. In *Wastewater Irrigation and Health: Assessing and Mitigating Risks in Low-income Countries* (ed. P. Drechsel, C. A. Scott, L. Raschid-Sally, M. Redwood and A. Bahri), pp. 381−394. London: Earthscan.

D. D. Mara and P. A. Sleigh (2010). Estimation of *Ascaris* infection risks in children under 15 from the consumption of wastewater-irrigated carrots. *Journal of Water and Health* **8** (1), 35−38.

D. D. Mara and P. A. Sleigh (2010). Estimation of norovirus infection risks to consumers of wastewater-irrigated food crops eaten raw. *Journal of Water and Health* **8** (1), 39−43.

M. A. Camargo Valero and D. D. Mara (2010). Ammonia volatilisation in waste stabilisation ponds: A cascade of misinterpretations? *Water Science and Technology* **61** (3), 555–561.

E. R. C. van der Linde, D. D. Mara and R. J. Newton (2010). Nitrogen removal during summer and winter in a primary facultative WSP pond: preliminary findings from ^{15}N-labelled ammonium tracer techniques. *Water Science and Technology* **61** (4), 979−984.

M. A. Camargo Valero, D. D. Mara and R. J. Newton (2010). Nitrogen removal in maturation waste stabilisation ponds via biological uptake and sedimentation of dead biomass. *Water Science and Technology* **61** (4), 1027−1034.

D. D. Mara and P. A. Sleigh (2010). Estimation of norovirus and *Ascaris* infection risks to urban farmers in developing countries using wastewater for crop irrigation. *Journal of Water and Health* **8** (3), 572−576.

M. A. Camargo Valero, L. F. Read, D. D. Mara, R. J. Newton, T. P. Curtis and R. J. Davenport (2010). Nitrification-denitrification in WSP: A mechanism for permanent nitrogen removal in maturation ponds. *Water Science and Technology* **61** (5), 1137−1146.

Duncan Mara and Andrew Sleigh (2010). Understanding and updating the 2006 who guidelines for the safe use of wastewater in agriculture. In *Reutilización de Aguas Regeneradas: Aspectos Tecnológicos y Jurídicos* (ed. T. M. N. Caballero), pp. 19−38. Murcia: Fundacíon Instituto Euromediterráneo del Agua.

D. D. Mara (2010). Sanitation in low-income urban areas: Technical options and financial arrangements. In *KfW Water Symposium 2009: Financing Sanitation − Improving Hygiene Awareness and Sanitation* (ed. D. Köhn and V. Pfeiffer), pp. 33−38. London: IWA Publishing.

D. D. Mara (2010). Sustainability of wastewater collection, natural treatment and reuse for food production and carbon capture. Presentation at World Water Week, Stockholm, 5−11 September (abstract available in *Abstract Volume World Water Week in Stockholm*, pp. 174−175, Stockholm International Water Institute, Stockholm, 2010).

Duncan Mara, Andrew Hamilton, Andrew Sleigh and Natalie Karavarsamis (2010). *Updating the 2006 WHO Guidelines: More Appropriate Tolerable Additional Burden of Disease, Improved Determination of Annual Risks, Norovirus and* Ascaris *Infection Risks, Extended Health-Protection Control Measures, Treatment and Non-treatment Options*. Geneva: World Health Organization.

S. M. Scheierling, C. Bartone, D. D. Mara and P. Drechsel (2010). *Improving Wastewater Use in Agriculture: An Emerging Priority* (Policy Research Working Paper No. 5412). Washington, DC: World Bank.

Duncan Mara, Jon Lane, Beth Scott and David Trouba (2010). Sanitation and health. *PLoS Medicine* (www.plosmedicine.org) **7** (11), e1000363.

In press:

D. D. Mara (2011). Discussion of 'High rates of ammonia removal in experimental oxygen-activated nitrification wetland mesocosms'. *Journal of Environmental Engineering* (in press).

D. D. Mara (2011). Water- and wastewater-related disease and infection risks: What is an appropriate value for the maximum tolerable additional burden of disease? *Journal of Water and Health* **9** (in press).

S. M. Scheierling, C. Bartone, D. D. Mara and P. Drechsel (2011). Toward an agenda for improving wastewater use in agriculture. *Water International* (in press).

On-line:

Duncan Mara (2008+). 'Sanitation: Personal and fairly maverick views on how international sanitation targets can be achieved'. Blog at www.duncanmarasanitation.blogspot.com.

E: Papers: 2006−2009

Duncan Mara (2006). *Water Supply and Sanitation Options for Small Urban Centres in Developing Countries*. Nairobi: UN-Habitat.

M. R. Peña Varón, D. D. Mara and G. P. Avella (2006). Dispersion studies analysis and treatment performance of an UASB reactor under different hydraulic loading rates. *Water Research* **40** (3), 445−452.

D. D. Mara (2006). Condominial sanitation could achieve MDG. *World Water* **29** (1), 18−19.

D. D. Mara and M. J. Johnson (2006). Aerated rock filters for enhanced ammonia and fecal coliform removal from facultative pond effluents. *Journal of Environmental Engineering, American Society of Civil Engineers* **132** (4), 574−577.

A. N. Shilton and D. D. Mara (2006). Waste stabilization pond design: a historical review. In *Pond Treatment Technology* (ed. A. N. Shilton), pp. 145−167. London: IWA Publishing.

D. D. Mara (2006). Pond process design: a practical guide. In *Pond Treatment Technology* (ed. A. N. Shilton), pp. 168−187. London: IWA Publishing.

D. D. Mara (2006). Use of treated wastewaters in agriculture. In *Aqua 2003: Multiple Uses of Water for Life and Sustainable Development* (ed. M. R. Peña, I. Restrepo, D. D. Mara and H. Gijzen), pp. 45−46. London: IWA Publishing.

D. D. Mara (2006). Waste stabilization ponds: time for aggressive marketing. In *Aqua 2003: Multiple Uses of Water for Life and Sustainable Development* (ed. M. R. Peña, I. Restrepo, D. D. Mara and H. Gijzen), pp. 129−130. London: IWA Publishing.

M. R. Peña and D. D. Mara (2006). High-rate anaerobic pond concept for domestic wastewater treatment: results from pilot-scale experience. In *Aqua 2003: Multiple Uses of Water for Life and Sustainable Development* (ed. M. R. Peña, I. Restrepo, D. D. Mara and H. Gijzen), pp. 137−142. London: IWA Publishing.

D. D. Mara (2006). Modern engineering interventions to reduce the transmission of diseases caused by inadequate domestic water supplies and sanitation in developing countries. *Building Services Engineering Research & Technology* **27** (2), 75−83.

K. L. Abis and D. D. Mara (2006). Temperature measurement and stratification in facultative waste stabilisation ponds in the UK climate. *Environmental Monitoring and Assessment* **114** (3), 35−47.

D. D. Mara (2006). Applications in developing countries. Paper presented at the CIBSE Seminar on the Role of Drainage in the Spread of Infection, London, 6 June.

D. D. Mara (2006). Constructed wetlands and waste stabilization ponds for small rural communities in the United Kingdom: a comparison of land area requirements, performance and costs. *Environmental Technology* **27** (4), 573−757.

D. D. Mara (2006). Wastewater-fed fishpond design. In *Guidelines for the Safe Use of Wastewater, Excreta and Greywater, Volume 3: Wastewater and Excreta Use in Aquaculture*, pp. 121−125. Geneva: World Health Organization.

D. D. Mara (2006). Wastewater treatment for wastewater reuse: required effluent qualities and how to achieve them at reasonable cost. Paper presented at the Regional EMWater Project Conference, Amman, 30 October − 1 November.

D. D. Mara (2006). Comment on "Minimizing land requirement and evaporation in small wastewater treatment systems". *Ecological Engineering* **28** (2), 181.

D. D. Mara (2006). Septic tanks, baffled facultative ponds and aerated rock filters: a high-efficiency low-cost wastewater treatment system for small communities up to ~500 p.e. *E-Water* (www.ewaonline.de/journal/online.htm), paper #19/06.

D. D. Mara (2006). Urine diversion: sometimes good, but not always. *Water21*, December, p. 11.

T. P. Curtis and D. D. Mara (2006). Waste stabilization ponds. In *Municipal Wastewater Management in Developing Countries* (ed. Z. Ujang and M. Henze), pp. 168−191. London: IWA Publishing.

C. G. Banda, P. A. Sleigh and D. D. Mara (2006). 3D-CFD modelling of *E. coli* removal in baffled primary facultative ponds: classical design optimization. Paper presented at the 7th IWA International Conference on Waste Stabilization Ponds, Bangkok, 25−27 September.

C. G. Banda, P. A. Sleigh and D. D. Mara (2006). 3D-CFD-based design of waste stabilization ponds: significance of wind velocity. Paper presented at the 7th IWA International Conference on Waste Stabilization Ponds, Bangkok, 25−27 September.

D. D. Mara (2006). Constructed wetlands are not a viable alternative or addition to waste stabilization ponds. Paper presented at the 7th IWA International Conference on Waste Stabilization Ponds, Bangkok, 25−27 September.

D. D. Mara, P. A. Sleigh, U. J. Blumenthal and R. M. Carr (2007). Health risks in wastewater irrigation: comparing estimates from quantitative microbial risk analyses and epidemiological studies. *Journal of Water and Health* **5** (1), 39−50.

Nguyen Thi Phong Lan, Anders Dalsgaard, Phung Dac Cam and Duncan Mara (2007). Microbiological quality of fish grown in wastewater-fed and non-wastewater-fed fishponds in Hanoi, Vietnam: influence of hygiene practices in local retail markets. *Journal of Water and Health* **5** (2), 209−218.

Duncan Mara, Jan-Olof Drangert, Nguyen Viet Anh, Andrzej Tonderski, Holger Gulyas and Karin Tonderski (2007). Selection of sustainable sanitation arrangements. *Water Policy* **9** (3), 305−318.

D. D. Mara and M. L. Johnson (2007). Ammonia removal from facultative pond effluents in a constructed wetland and an aerated rock filter: performance comparison in winter and summer. *Water Environment Research* **79** (5), 567−570.

D. D. Mara and M. L. Johnson (2007). Waste stabilization ponds and rock filters: solutions for small communities. *Water Science and Technology* **55** (7), 103−107.

M. A. Camargo Valero and D. D. Mara (2007). Nitrogen removal in maturation ponds: tracer experiments with ^{15}N-labelled ammonia. *Water Science and Technology* **55** (11), 81−85.

M. A. Camargo Valero and D. D. Mara (2007). Nitrogen removal via ammonia volatilization in maturation ponds. *Water Science and Technology* **55** (11), 87−92.

M. L. Johnson, M. A. Camargo Valero and D. D. Mara (2007). Maturation ponds, rock filters and reedbeds in the UK: statistical analysis of winter performance. *Water Science and Technology* **55** (11), 135−142.

C. Paterson, D. D. Mara and T. P. Curtis (2007). Pro-poor sanitation technologies. *Geoforum* **38** (5) 901−907.

D. D. Mara (2007). Decentralized wastewater management. Paper presented at the GTZ Conference on Sustainable Wastewater Management, Cairo, 10−11 September.

J. H. J. Ensink, W. van der Hoek, D. D. Mara and S. Cairncross (2007). Waste stabilization pond performance in Pakistan and its implications for wastewater use in agriculture. *Urban Water Journal* **4** (4), 261−267.

D. D. Mara (2007). Reuse of wastewater for agriculture. *Sustainable Water Management* (www.zer0-m.org) (2), 20−22.

D. D. Mara (2007). How to transpose the 2006 WHO guidelines into national standards. Paper presented at the Sixth IWA International Specialist Conference on Wastewater Recyling and Reuse for Sustainablity, Antwerp, 9−12 October.

D. D. Mara (2007). Wastewater treatment requirements for wastewater use in agriculture: implications of the 2006 WHO Guidelines. Paper presented at the Sixth IWA International Specialist Conference on Wastewater Recyling and Reuse for Sustainablity, Antwerp, 9−12 October.

M. A. Camargo Valero and D. D. Mara (2007). Nitrogen transformation and removal in maturation ponds: tracer experiments with ^{15}N stable isotopes in the UK in summer. Paper presented at the Second International Congress 'SmallWat07' Wastewater Treatment in Small Communities, Seville, 11−15 November.

D. D. Mara (2008). Quantifying health risks in wastewater irrigation. In *Water and Health* (ed. W. O. K. Grabow) − part of the on-line UNESCO *Encyclopedia of Life Support Systems*. Oxford: Eolss Publishers (www.eolss.net).

Duncan Mara and Annika Kramer (2008). The 2006 WHO Guidelines for wastewater and greywater use in agriculture: a practical interpretation. In *Efficient Management of Wastewater: Its Treatment and Reuse in Water Scarce Countries* (ed. I. Al Baz, R. Otterpohl and C. Wendland), pp. 1−17. Heidelberg: Springer-Verlag.

Duncan Mara (2008). Waste stabilization ponds: a highly appropriate wastewater treatment technology for Mediterranean countries. In *Efficient Management of Wastewater: Its*

Treatment and Reuse in Water Scarce Countries (ed. I. Al Baz, R. Otterpohl and C. Wendland), pp. 113−123. Heidelberg: Springer-Verlag.

D. D. Mara and G. P. Alabaster (2008). A new paradigm for low-cost urban water supplies and sanitation in developing countries. *Water Policy* **10** (2), 119−129.

D. D. Mara (2008). Technical solutions for the urban poor: Going to scale with proven low-cost solutions. Presentation at AfricaSan2008, Durban, 18−20 February.

A. N. Shilton, D. D. Mara, R. Craggs and N. Powell (2008). Solar-powered aeration and disinfection, anaerobic co-digestion, biological CO_2 scrubbing and biofuel production: the energy and carbon management opportunities of waste stabilization ponds. *Water Science and Technolgy* **58** (1), 253−258.

D. D. Mara (2008). *Third Edition of the Guidelines for the Safe Use of Wastewater, Excreta and Greywater in Agriculture and Aquaculture − Guidance Note for Programme Managers and Engineers: A Numerical Guide to Volume 2 of the Guidelines and Practical Advice on how to Transpose them into National Standards*. Geneva: World Health Organization.

Duncan Mara and Jeff Broome (2008). Sewerage: a return to basics to benefit the poor. *Proceedings of the Institution of Civil Engineers − Municipal Engineer* **161** (4), 231–237.

D. D. Mara (2009). Health risks in urban agriculture when using wastewater or partially treated wastewater for crop watering. Presentation at World Bank Water Week, Washington DC, 17−19 February; available at: http://siteresources.worldbank.org/EXTWAT/Resources/4602122-1213366294492/5106220-1234469721549/10.2_Urban_Wastewater_Reuse_in_Agriculture.pdf.

R. Hamdan and D. D. Mara (2009). The effect of aerated rock filter geometry on the rate of nitrogen removal from facultative pond effluents. Paper presented at the IWA International Conference 'Ponds2009', Belo Horizonte, Brazil, 26−30 April.

D. D. Mara (2009). Waste stabilization ponds: past, present and future. *Desalination and Water Treatment* **4,** 85–88.

M. A. Camargo Valero, M. Johnson, T. Mather and D. D. Mara (2009). Enhanced phosphorus removal in a waste stabilization pond system with blast furnace slag filters. *Desalination and Water Treatment* **4**, 122–127.

M. A. Camargo Valero and D. D. Mara (2009). The influence of algal biomass on tracer experiments in maturation ponds. *Desalination and Water Treatment* **4**, 89–92.

D. D. Mara (2009). What works in preventing water-related disease: Infrastructure solutions? Presentation at the Executive Session on Grand Challenges of the Sustainability Transition: Water and Human Well Being (Sustainability Science Program, Center for International Development, Harvard University), Venice International University, San Sérvolo, Venice, 20−21 July.

C. A. Madera, J. Silva, D. D. Mara and P. Torres (2009). Wastewater use in agriculture: Irrigation of sugar cane with effluents from the Cañaveralejo wastewater treatment plant in Cali, Colombia. *Environmental Technology* **30** (10), 1011–1015.

D. D. Mara (2009). Natural wastewater treatment and carbon capture: The way forward? Paper presented at the International Conference *Agua 2009: La Gestión del Recurso Hídrico Frente al Cambio Climático*, Santiago de Cali, 9−12 November.

D. D. Mara (2009). Utility-supplied but community-managed water supplies and sanitation: A solution for urban slums? Paper presented at the International Conference *Agua 2009: La Gestión del Recurso Hídrico Frente al Cambio Climático*, Santiago de Cali, 9−12 November.

F. Papers: 2000−2005

D. D. Mara (2000). Sustainable sanitation in peri-urban areas: a long-term perspective. In *Urban Stability through Integrated Water-related Management* (Proceedings of the Ninth Stockholm Water Symposium), pp. 357-365. Stockholm: Stockholm International Water Institute.

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Research Grants 1988 to present

1. Overseas Development Administration
April 1988 - March 1989
The enumeration of human intestinal nematode eggs in raw and treated wastewater
£23,703
Joint grantholder: Professor Lee (Pure and Applied Biology).

2. Overseas Development Administration
April 1988 - March 1992
Evaluation of waste stabilization ponds in Kenya
£172,968
Joint grantholder: Dr H W Pearson (Department of Genetics and Microbiology, University of Liverpool).

3. Overseas Development Administration
February 1989 - October 1992
Evaluation of risks to human health from parasitic nematodes in treated wastewater used for unrestricted crop irrigation
£214,737
Joint grantholder: Professor D Lee

4. Overseas Development Administration
February 1990 - January 1991
Lime treatment of municipal wastewater
£40,093

5. Overseas Development Administration
March 1990 - March 1993
Development of an innovative approach to waste stabilization pond design
£417,994
Joint grantholder: Dr H W Pearson

6. Overseas Development Administration
April 1993 - March 1995
Sequential batch-fed effluent storage reservoirs
£360,504
Joint grantholder: Dr H W Pearson

7. Overseas Development Administration
July 1993 - March 1994
Research Dissemination: Research Monographs in Tropical Public Health Engineering
£21,4378.

8. Yorkshire Regional Health Authority
July 1993 - March 1994
An investigation into the waterwashed transmission of gastro-intestinal diseases in primary schools in Leeds and the role of handwashing in interrupting their faeco-oral transmission route
£29,200
Joint grantholder: Dr M. Schweiger (Leeds Healthcare)

9. Overseas Development Administration
November 1994 – March 1995
Research Dissemination: Research Monographs in Tropical Public Health Engineering (continuation)
£19,155

10. Department for International Development
January 1999 – December 2000
Income generation through the provision of integrated sanitation systems for low-income urban communities
£240,000
Joint grantholder: Dr G. P. Alabaster (United Nations Centre for Human Settlements, Nairobi).

11. NHS Estates and Development Fund
December 1998 – November 1999
The UV disinfection of* Mycobacterium tuberculosis *and other airborne pathogens in UK hospital buildings
£83,000
Joint grantholders: Dr C. B. Beggs and Dr P. A. Sleigh (School of Civil Engineering), Dr K. G. Kerr (Department of Microbiology) and Dr J. K. Donnelly (Trinity and All Saints University College).

12. NHS Estates and Development Fund
January 2000 – June 2001
The use of small negative air ions to disinfect MRSA and other airborne pathogens in UK hospital buildings
£83,000
Joint grantholders: Dr C. B. Beggs, Dr P. A. Sleigh, Dr K. G. Kerr and Dr J. K. Donnelly

13. Engineering and Physical Sciences Research Council
January 2000 – December 2002
UV disinfection of* Mycobacterium *and other airborne pathogens in hospital buildings
£220,000
Joint grantholders: Dr C. B. Beggs, Dr P. A. Sleigh, Dr K. G. Kerr and Dr J. K. Donnelly

14. Department for International Development
January – September 2000
PC-based simplified sewer design
£56,000
Joint grantholder: Dr P.A. Sleigh

15. Yorkshire Water and Anglian Water
April 2000 – February 2003
Waste stabilization ponds in the United Kingdom
£32,000

16. Engineering and Physical Sciences Research Council
April 2001 – March 2002
Waste stabilization ponds in the United Kingdom: Nitrogen removal
£59,000.

17. BOC Foundation, Yorkshire Water and University of Leeds
Aerated rock filters
April 2003− May 2004
£32,000

18. Engineering and Physical Sciences Research Council
Nitrogen removal pathways and mechanisms in WSP in the UK
July 2004 − September 2007
£190,000
Joint grant holder: Professor T. P. Curtis (College of Engineering, University of Newcastle)

19. BOC Foundation
Phosphorus removal in rock filters
July 2006 − June 2007
£48,000

20. Knowledge Transfer Partnership: Mansfield Pollard & Co. Ltd, Bradford
Development of industry-leading 'airside' ultra-violet sterilisation products
February 2008 − May 2010
£92,000
Joint grantholders: Dr P.A. Sleigh, Dr C.J. Noakes and Dr L.A. Fletcher

21. Engineering and Physical Sciences Research Council
Cost-effective production of renewable liquid biofuel and chemicals through the thermochemical liquefaction of aquatic biomass
April 2008 − September 2009
£135,848
Joint grantholders: Dr J. M. Jones and Dr A. Ross (Energy Resources Research Unit, SPEME)